

transmission type liquid crystal display 29 is exposed for recording at an exposure angle of θ_e . Further, the element hologram image d_{21} is assumed to have an image size, in terms of resolution, of 640 pixels in the vertical direction and 480 pixels in the parallax direction.

Hence, the viewing point conversion processing is an image processing whereby the element parallax images d_{11} in the number of m sheets that constitute the parallax image data string D_3 are interchanged to form the element hologram images d_{21} in the number of "n" sheets so as to reconstruct a new set of the element hologram image data D_5 . The viewing point conversion processing is executed by interchanging the element parallax images d_{11} by a minimum unit thereof, namely, by an element image in a strip-form with 640 pixels in the vertical direction and one pixel in the horizontal direction. By sampling this element image information from the element parallax images d_{11} in the number of "m" sheets, the element hologram image data D_5 having an image size of 640 pixels in the vertical direction and 480 pixels in the horizontal (parallax) direction is reconstructed.

Further, with reference to FIG. 9, the viewing point conversion processing will be described more specifically. FIG. 9 shows a state of one element hologram image d_{21} selected from among those shown in FIG. 8, and how it is reconstructed. The element hologram image d_{21} is reconstructed through arithmetic operation to be executed for respective image information at respective sampling points $mp_{11}, mp_{12}, \dots, mp_{1k}$ on the viewing point distance dv whereby each of them is determined from which

element parallax image d1 in the parallax image data string D3 to be mapped.

For this mapping, assume an imaginary line connecting between an exposure point epl and respective sampling points mp11, mp12, ---, mp1k of the element hologram image d21, namely, a mapping line ml. A parallax image to be selected from among the parallax image data string D3 is determined to be that which has a closest viewing point to the point of an intersection between this mapping line ml and a plane DV on the viewing point distance dv, namely, respective sampling points mp11, mp12, ---, mp1k. By the way, for simplification of explanation, it is shown in this drawing that all of the viewpoints of the parallax image data string D3 and all of the sampling points are shown to coincide with each other, however, needless to mention, they do not necessarily coincide with each other depending on conditions of setting of imaging (image capturing) parameters for the parallax image data string D3, and/or setting of parameters for the holographic stereogram 51 to be produced. Because the element hologram image d21 has the image size of 640 pixels in the vertical direction and 480 pixels in the horizontal direction as described above, the number of sampling in the parallax direction, namely, the number of pixels therein is "480", hence k=480.

As for the sampling point mp11, a parallax image having the closest viewing point thereto, namely, an element parallax image d11 having its viewpoint at mp11 is selected. Then, a piece of parallax information of 640 vertical pixels and one horizontal pixel existing at

a cross point op_{1j} on the surface of a screen DD at the image shooting distance df , at which the mapping line m_{11} interconnecting between the exposure point ep_{11} and the viewing point mp_{11} of that element parallax image d_{11} ,

5 and extending toward a screen of the element parallax image d_{11} , meets with the screen DD, is sampled and mapped to the sampling point mp_{11} . Here, op denotes sampling points of the parallax image data string D_3 , and each parallax image has sampling points to the number of
10 j . For example, the element parallax image d_{11} has sampling points at $op_{11}, op_{12}, \dots, op_{1j}$. Because each element parallax image d_1 is captured with an image size of 640 pixels in the vertical direction and 480 pixels in the horizontal direction, $j=480$.

15 In the viewing point conversion processing, by executing the image processing described above for the other sampling points mp_{12}, \dots, mp_{1k} , respectively, a new element hologram image d_2 is reconstructed from the parallax image data string D_3 . Further, in the viewing
20 point conversion processing, the similar image processing is repeated with respect to the other exposure points ep_{12}, \dots, ep_{1j} so as to reconstruct sequentially element hologram images $d_{22}, d_{23}, \dots, d_{2n}$ at respective exposure points ep . These element hologram image data D_5
25 reconstructed as described above are displayed on the transmission type liquid crystal display 29 sequentially, and the object light L_2 transmitted through this liquid crystal display 29 which interferes with the reference light L_3 is exposed and recorded as the element hologram
30 image in the strip-form sequentially on the hologram recording medium 4.